Remarks/Arguments:

Claims 23-26 and 31-56 are pending in the application. Claims 37 and 45 have been withdrawn from consideration.

Claim Rejections - 35 USC § 112

Claims 23-26, 31-36, 38-44, and 46-56 are rejected under 35 USC § 112, 2nd paragraph, as indefinite with respect to what the amounts of the "metal component" and the "at least one alkali metal" are based on. Claims 23, 25, and the other claims as needed have been amended to clarify that the recited amounts relate to a gram of xerogel. No new matter has been added.

Regarding the remainder of the rejections, the applicants submit that there is no teaching in any of the cited references, when read by the person of ordinary skill in the art, of the feature of independent claim 23 (and hence all of the claims) reciting at least one alkali metal in an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel. Detailed reasons for this assertion will now be provided.

Claim Rejections - 35 USC § 102

Claims 23, 31-33, 35, 36, 52-54, and 56 are rejected under 35 USC § 102(b) as anticipated by GB 1279250 ("GB 250). With reference to the claim limitations relating to the amount of various metals in the xerogel, the office action states that "... it is not completely clear whether or not GB 250 falls within the intended amount range. Nevertheless, it is asserted that that the amount of metal component and alkali metal of GB 250 is within the range intended as both the [sic] GB 250 and the instant invention achieve the same particular action (i.e. the removal of undesirable material from a beer product)." The applicants point out that, if it is "not completely clear" whether the claim limitations are met, it is logically improper to assert that they are in fact met. Further, there is no logical basis for asserting that, if two products achieve the same generic result (removal of undesirable material, not necessarily to the same degree), their compositions must be the same. There may be several ways to arrive at a similar, or even identical, result, and thus achieving the same result is not proof of having used the same means to achieve that result.

Indeed, it is apparent that GB 250 does not disclose a silica xerogel "wherein said metal component comprises at least one alkali metal in an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel" as instantly claimed, nor does it teach a xerogel having a pH between

8.0 and 10.5. Nowhere in GB 250 is the final alkali metal level actually revealed. However, what is revealed are the washing processes employed, which fall into two general categories: (1) washing with town water, then ammonium sulfate solution, then town water again [Example 1], or (2) washing with sulfuric acid followed by town/DI water [Examples 2-8]. One skilled in the art of silica gel chemistry would recognize that these are standard preparation procedures designed to wash the gel substantially free of Na impurities, so that the gels of GB 250 would not fall within the claimed range of 0.2 to 1.0 mmol of alkali metal per gram of xerogel. Further, the GB 250 reference does not disclose the pH of the resulting silica xerogels. However, it should be noted that all of samples 1-8 were formed at an acidic pH and/or washed with acidic water before drying to form a xerogel, and thus none of the resulting xerogels would be expected to have a pH from 8.5-10 as claimed. Accordingly, at least these two claim elements have not been provided by GB 250, and the rejection is therefore improper and should be withdrawn.

Claims 23-26, 31-36, 38, 40-44, and 47-51 are rejected under 35 USC § 102(b) as anticipated by Tanaka et al (U.S. 5,622,743, "Tanaka"). However, in the paragraph spanning columns 2 and 3 Tanaka specifies an alkali or alkaline earth content that is much lower than the instantly claimed range. Tanaka discloses that his silica gel has the following composition: $aM_2/_mO.SiO_2.nH_2O$, where M is an alkali metal or alkaline earth metal having a valence of m, a is a number between 0 and $5x10^{-3}$, and n is a number between 0 and 0.2. In the case of the maximum Na content, the composition would be $5x10^{-3}$ $Na_2O.SiO_2$, which is equivalent to 0.16 mmol Na per gram of silica (SiO_2). In contrast, all of the present claims recite a minimum alkali metal content of 0.2 mmol per gram of silica xerogel. Accordingly, at least this claim element has not been provided by Tanaka, and the rejection is therefore improper and should be withdrawn.

Further, and contrary to the office action's assertion, Tanaka's silica gels do not fall within the pH range of 8.0-10.5 recited in the present claims. Rather, Tanaka specifies a pH range of 4-6.2 (see paragraph spanning columns 2 and 3), and none of his examples fall within the claimed 8.0-10.5 range. The only silica gel reported by Tanaka to have a pH in this range is a comparative example not according to his invention, labeled sample H7 in Table 2. However, that sample fails to meet the claim limitation reciting "wherein said metal component comprises at least one alkali metal in an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel." As described in column 8 at lines 51-55, sample H7 includes $5x10^{-3}$ mole (i.e., 5

mmol) of Na per mole of silica, which calculates to 0.08 mmol of Na per gram of silica, well below the instantly claimed lower limit of 0.2.

Claims 23-26, 31-36, 40-44, 49-54, and 56 are rejected under 35 USC § 102(b) as anticipated by Berg et al (U.S. 5,149,553, "Berg") or WO 00/66705 ("WO 705"). However, in both references, the metal component is clearly stated to be a multivalent metal. It is not true that the claimed silica xerogels include sodium or potassium, except as impurities. For example, Berg teaches that:

> The gelled spheres were introduced into an aqueous solution of magnesium sulfate. The sulfate solution contained 5% $MgSO_4$ and upon addition of the silica gel had a pH of about 8.5 which persisted during the three hour contact time. The reacted gel was washed three times with deionized water to remove the sodium salts formed and the residual magnesium sulfate salts. The volume of water used in each wash step equaled the volume of the reacted gel. The gel was dried to a loss on drying (LOD) of 15% and milled to an average particle size of 17 microns. The product contained 2.5% MgO which is equivalent to the sodium which was not neutralized. (Example 1, emphasis added)

It is clear from the first underlined passage that Berg intends to remove all of the alkali metal (sodium, in this case) from the silica gel. In at least this example, it is clear that he succeeds in doing this because, as described in the second underlined passage, all of the unneutralized sodium (i.e., sodium corresponding to the excess of sodium silicate used in this example, in which only 75% was neutralized) is replaced with magnesium. This leaves essentially no sodium in the silica gel.

Regarding WO 705, that reference states that:

> In exchanger 18, the hydrogel particles are contacted with an aqueous solution of a metal salt, such as magnesium sulfate, for a period of time sufficient to replace essentially all of the unreacted sodium or potassium on the surface of, and within, the silica particles with the substituting metal. (page 6, lines 3-6, emphasis added)
>
> Sufficient time was allowed for essentially all of the unneutralized sodium to exchange with magnesium. (page 12, lines 11-12, emphasis added)

Again, essentially no sodium is left in the silica. Therefore, neither Berg nor WO 705 discloses silica xerogels "wherein said metal component comprises at least one alkali metal in

an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel" as instantly claimed, and thus the rejections should be withdrawn.

Claim Rejections - 35 USC § 103

Claims 39, 47, 48 and 55 are rejected under 35 USC § 103(a) as unpatentable over WO 705. The office action states that cetin of the claimed additives and hydrothermal treatment are disclosed in WO 705. However, as noted above, WO 705 fails to teach at least the claim element reciting "wherein said metal component comprises at least one alkali metal in an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel," nor does the rejection explain how a person of ordinary skill would be motivated to deviate from the teachings of WO 705 to arrive at this level. Thus at least this claim feature is not provided, and accordingly, WO 705 is deficient as the basis for a *prima facie* case of obviousness. Therefore the rejection should be withdrawn.

Claims 23, 31-33, 35, 36, 52-54, and 56 are rejected under 35 USC § 103(a) as unpatentable over GB 250. The office action asserts that:

> If it is shown that the particular amount of metal component and alkali metal employed in GB 250 would not fall within the claimed range, such determination would have been well within the purview of a skilled artisan, and it would have been obvious ... to have arrived at such amount as a matter [of] preference regarding the degree of haze removal desired and to have achieved same through routine experimental optimization.

The applicants submit that this statement is inaccurate because GB 250 does not disclose that varying the amount of alkali metal is useful for any particular purpose, including reduction of chill haze. There is no indication that changing from one alkali metal level to the other has any effect at all, and the reader thus derives no teaching or suggestion as to how to vary this parameter, what the results of such variation might be, or even a suggestion to vary it at all. Indeed, a particular parameter must first be recognized in the prior art as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977), emphasis added. Alkali metal content is not a result-effective variable, by this definition.

A result-effective variable must by definition refer to some specific result against which effectiveness can be measured. With respect to the amount of alkali metal, the office fails to identify a teaching in GB 250 of any such result, nor can the applicants find one in GB 250. There is no indication that the amount of alkali metal is result effective for any property of relevance to the purposes of the GB 250 invention, and thus it is not a recognized result effective variable, and its optimization cannot be *prima facie* obvious. For this reason alone, GB 250 is deficient as a basis for *prima facie* obviousness.

Further, even if the reader of GB 250 nonetheless did somehow arrive at the idea to vary the amount of alkali metal to control reduction of chill haze, there is in any case no evidence that he would be led to increase the level of alkali metal beyond what is taught in GB 250, and thereby arrive at the claimed amount. There is no hint in GB 250 that it might be desirable to remove only SOME of the chill haze. Rather, it is clear that greater removal is always the objective. At the same time, GB 250 teaches lower alkali metal levels than those presently claimed, and as discussed above it teaches washing away the alkali metal. Thus, if the skilled artisan somehow concluded (despite the lack of explicit teaching in GB 250) that alkali metal level is relevant to chill haze removal, he would likely conclude by looking at the examples that very low levels of alkali metal (or none at all) should be sought. And, since there is no teaching or suggestion to seek intermediate levels of chill haze, there would be no suggestion to increase the amount of alkali metal in an effort to realize that goal. All things considered, there is no motivation to deviate from the actual disclosure of GB 250 and increase alkali metal content to levels not disclosed or suggested therein. Thus the claim feature "wherein said metal component comprises at least one alkali metal in an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel" has not been provided, and thus GB 250 is deficient in at least this respect as the basis for a *prima facie* case of obviousness. Accordingly, the rejection should be withdrawn.

Claims 23-26, 31-36, 38, 40-44, and 47-56 are rejected under 35 USC § 103(a) as unpatentable over Tanaka. The office action asserts that:

> If it is shown that the particular amount of metal component and alkali metal employed in Tanaka would not fall within the claimed range, such determination would have been well within the purview of a skilled artisan, and it would have been obvious ... to have arrived at such amount as a matter [of] preference regarding the degree of haze removal desired and to have achieved same through routine experimental optimization.

The applicants reiterate the comments presented above with respect to the requirement that "optimization" be with respect to a known result-effective variable. Although Tanaka sets a limitation for the overall metal content of the silica (alkali metal plus alkaline earth metal), he teaches nothing with respect to the importance of alkali metal level itself in the silica gel. Thus, this variable is not taught as a result-effective variable, and accordingly a rejection predicated upon "optimization" of this variable cannot properly be made.

Further, as noted above, the highest alkali metal content disclosed by Tanaka is 0.16 mmol per gram of silica (SiO_2), lower than the instantly claimed 0.2 mmol per gram of silica xerogel, and he provides no suggestion to go higher than this amount. Still further, Tanaka's silica gels do not fall within the pH range of 8.0-10.5 recited in the present claims, but instead are in a range of pH of 4-6.2. This is far outside the range of the present invention, and again there is no suggestion in Tanaka that going to such a high pH level would be desirable, or even workable. Thus no motivation has been provided to deviate from the explicit teachings of Tanaka with respect to either of these two variable, and Tanaka does not support a *prima facie* case of obviousness. Accordingly, the rejection should be withdrawn.

Claims 23-26, 31-36, 40-44, 49-54, and 56 are rejected under 35 USC § 103(a) as unpatentable over Berg or WO 705. Claims 39, 47, 48 and 55 are rejected under 35 USC § 103(a) as unpatentable over WO 705. The office action asserts that:

> If it is shown that the particular amount of metal component and alkali metal employed in Berg or WO 705 would not fall within the claimed range, such determination would have been well within the purview of a skilled artisan, and it would have been obvious ... to have arrived at such amount as a matter [of] preference regarding the degree of haze removal desired and to have achieved same through routine experimental optimization.

The applicants reiterate the comments presented above with respect to the requirement that "optimization" be with respect to a known result-effective variable. As discussed hereinabove, neither Berg nor WO 705 teaches anything with respect to the importance of alkali metal level in the silica gel. Thus, this variable is not taught as a result-effective variable, and accordingly a rejection predicated upon "optimization" of this variable cannot properly be made. Further, for reasons that are not explained, both references nonetheless explicitly teach removing essentially all of the alkali metal from the silica gel, and thus by inference teach against setting a minimum level of alkali metal content in the silica gel. A reference that

teaches against a claim feature cannot render that claim obvious, and thus neither Berg nor WO 705 provides the basis of a *prima facie* case of obviousness against the instant claims. Accordingly, the rejection should be withdrawn.

Claims 23, 31-36, 39, and 52-56 are rejected under 35 USC § 103(a) as unpatentable over Hu et al (U.S. 6,555,151, "Hu"). The applicants note that U.S. 6,444,151 is recited in the office action, and believe this to be in error. Correction is requested if this is not the case. The office action asserts that Hu discloses a xerogel that includes sodium or potassium, and points to column 2 lines 61-63, column 3 line 2, and column 5 lines 13-25 in support of this contention. This assertion is in error, because the cited passages refer to hydrogels, not xerogels as recited in the instant claims. Further, the cited passages do not disclose the amount of alkali metal content of the hydrogels. Whatever the amount of alkali metal present in the hydrogels, considerable washing (and loss of alkali metal) is performed before drying (i.e., before formation of the xerogel), as discussed further below. Thus Hu does <u>not</u> disclose a silica xerogel wherein said metal component comprises at least one alkali metal in an amount between 0.2 mmol and 1.0 mmol per gram of the xerogel, as instantly claimed.

The office action goes on to state that "... it is not completely clear whether or not Hu et al falls within the intended amount range. Nevertheless, it is asserted that that the amount of metal component and alkali metal of Hu et al is within the range intended as both the [sic] Hu et al and the instant invention achieve the same particular action (i.e. the removal of undesirable material from a beer product)." The applicants submit that this line of reasoning is logically incorrect, for the reasons set forth above with respect to the § 102 rejection over GB 250. The office action further asserts that:

> If it is shown that the particular amount of metal component and alkali metal employed in Hu et al would not fall within the claimed range, such determination would have been well within the purview of a skilled artisan, and it would have been obvious ... to have arrived at such amount as a matter [of] preference regarding the degree of haze removal desired and to have achieved same through routine experimental optimization.

The applicants reiterate the comments presented above with respect to the requirement that "optimization" be with respect to a known result-effective variable. However, Hu does not teach anything with respect to the importance of alkali metal level in the silica gel. Thus, this variable is not taught as a result-effective variable, and accordingly a rejection predicated upon

"optimization" of this variable cannot properly be made. Further, Hu nonetheless teaches conditions, the natural result of which is to remove essentially all of the alkali metal from the silica gel. Hu teaches as follows:

> The hydrogel is then washed in the washer 112 with acidified water to remove salts from the hydrogel. Multiple washings may occur as is well-known in the art, until the salt concentration in the effluent is at or below an acceptable level, preferably at or close to zero. (Column 3, lines 56-60)

One skilled in the art would understand that such extensive washing of a silica gel at acidic pH (2.5-4.0, as stated on line 64 of column 3) would remove substantially all Na, certainly to below the claimed minimum of 0.2 mmol per gram of xerogel. Thus, by inference, Hu teaches against setting a minimum level of alkali metal content in the silica gel. As noted above, a reference that teaches against a claim feature cannot render that claim obvious, and thus Hu does not provide the basis of a *prima facie* case of obviousness against the instant claims. Accordingly, the rejection should be withdrawn.

Claims 24-26, 40-44, and 47-51 are rejected under 35 USC § 103(a) as unpatentable over Hu taken together with Berg, WO 705, or Tanaka. The office action directs its comments to the teachings of the various references with respect to alkaline earth metals in the silica. However, for the reasons cited above, the cited references do not teach the instantly recited limitation relating to alkali metal content in a xerogel, either alone or in combination. Thus not all claim elements are taught, and the rejection should be withdrawn.

Claims 38 and 46 are rejected under 35 USC § 103(a) as unpatentable over any one of GB 250, Hu, Berg, WO 705, and Tanaka and further in view of Armstead et al (U.S. 4,515,821, "Armstead"). The deficiencies of GB 250, Hu, Berg, WO 705, and Tanaka with respect to alkali metal content have already been discussed, and Armstead does not remedy these deficiencies. Armstead is directed to calcining silica gels for use in beer clarification, but he does not teach the instantly recited limitation relating to alkali metal content in a xerogel, either alone or in combination. Thus not all claim elements are taught, and the rejection should be withdrawn.

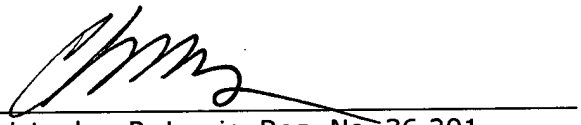
Claim 55 is rejected under 35 USC § 103(a) as unpatentable over GB 250 or Berg taken together with Tanaka, WO 705, or Hu. Claim 39 is rejected under 35 USC § 103(a) as unpatentable over either one of GB 250 or Hu taken together with WO 705. Claims 39, 47, and 48 are rejected under 35 USC § 103(a) as unpatentable over Berg taken together with WO 705.

The cited references are all deficient, alone or in combination, for the reasons already set forth above, and the rejections should therefore be withdrawn.

Conclusion

For all of the reasons recited above, the applicants submit that the rejections have been overcome, and request reconsideration and allowance of the pending claims. The applicants invite the examiner to contact their undersigned representative, Frank Tise, if it appears that such contact may expedite examination.

Respectfully submitted,



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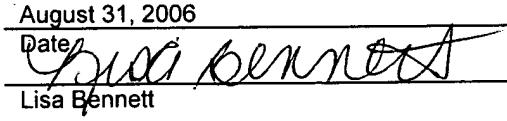

Lisa Bennett